We Claim:

1. An article comprising a tube having a circumference wherein the circumference of said tube increases in response to the application of internal pressure up to a second circumference, thereafter the circumference remaining substantially unchanged with further increasing internal pressure.

~~2. The tube of claim 1 comprising porous polytetrafluoroethylene.~~

~~3. The tube of claim 2 having a wall thickness less than or equal to about 0.25 mm.~~

4. The tube of claim 3 having a wall thickness less than or equal to about 0.10 mm.

~~5. The tube of claim 2 wherein said porous polytetrafluoroethylene has a microstructure of nodes interconnected by fibrils~~

6. The tube of claim 5 in which said ~~tube comprises~~ a porous polytetrafluoroethylene tube, said tube being ~~covered by~~ one or more helical layers of porous polytetrafluoroethylene material.

7. The tube of claim 6 in which said porous polytetrafluoroethylene material is in the form of a tube.

8. The tube of claim 6 in which said porous polytetrafluoroethylene material is in the form of a film.

9. The tube of claim 6 in which said porous polytetrafluoroethylene material is thermally bonded to the porous polytetrafluoroethylene tube.

10. The tube of claim 6 in which the tube exhibits minimal recoil following removal of a circumferentially distending force.

11. The tube of claim 10 exhibiting minimal recoil of 14 percent or less.

12. The tube of claim 11 exhibiting minimal recoil of 10 percent or less.

13. The tube of claim 12 exhibiting minimal recoil of 7 percent or less.

14. The tube of claim 6 ~~comprising~~ a vascular graft.

15. The tube of claim 14 having a wall thickness less than or equal to about 0.25 mm.

16. The tube of claim 15 having a wall thickness less than or equal to about 0.10 mm.

17. The tube of claim 14 having first and second opposing ends wherein the second circumference at the first opposing end is larger than the second circumference at the second opposing end whereby the tube is tapered between the first and second opposing ends.

18. The tube of claim 14 wherein the tube is branched and has at least three ends.

19. The tube of claim 14 ~~comprising~~ adapted for use as an intraluminal graft.

20. The tube of claim 19 wherein the intraluminal graft is secured to a blood conduit by sutures.

21. The tube of claim 19 wherein the intraluminal graft is secured to a blood conduit by a stent.

22. The tube of claim 19 wherein the circumference is increased by inflating a balloon.

23. The tube of claim 19 wherein the circumference is increased by blood pressure.

24. The tube of claim 1 ~~comprising~~ adapted for use as a vascular graft.

25. The tube of claim 24 ~~comprising~~ adapted for use as an intraluminal graft.

26. The tube of claim 1 wherein the tube exhibits minimal recoil following a substantial reduction in pressure.

27. The tube of claim 1 wherein the tube comprises an interior liner within a tubular form selected from the group consisting of tubes, pipes and blood conduits.

28. The tube of claim 27 wherein the blood conduits are prosthetic vascular grafts.

29. The tube of claim 27 wherein the blood conduits are living blood vessels.

30. The tube of claim 27 wherein the interior liner covers an anastomosis.

31. The tube of claim 1 having first and second opposing ends wherein the second circumference at the first opposing end is larger than the second circumference at the second opposing end whereby the tube is tapered between the first and second opposing ends.

32. The tube of claim 1 wherein the tube is branched and has three ends.

33. An article comprising a porous polymeric tube having a first circumference at a first internal pressure of atmospheric pressure, a second circumference at a second internal pressure greater than atmospheric pressure, said second circumference being greater than the first circumference, wherein upon applying an internal pressure greater than the second internal pressure, the porous polymeric tube still substantially has the second circumference.

~~34. The article of claim 33 wherein said tube comprises porous polytetrafluoroethylene.~~

~~35. The article of claim 34 wherein said tube comprises a vascular graft.~~

36. A tube having a longitudinal axis, said tube comprising first and second helically wound layers of tape, said tube having a first circumference at a first time and a second circumference at a second time subsequent to the first time, said second circumference being greater than said first circumference, wherein the first and second helically wound layers of tape are oriented at different angles respectively with regard to the longitudinal axis of the tube when said tube has the first circumference, and wherein the angle of the first helically wound layer of tape with respect to the longitudinal axis changes when the tube changes from the first circumference to the second circumference.

37. A tube according to claim 36 wherein the angle of the second helically wound layer of tape with respect to the longitudinal axis changes when the tube has the second circumference.

38. A tube according to claim 37 wherein said second circumference results from the application of increasing pressure within the tube.

39. A tube according to claim 36 wherein said second circumference results from the application of increasing pressure within the tube.

40. A tube according to claim 36 comprised of porous polytetrafluoroethylene.

41. A tube according to claim 36 ~~comprising~~ adapted for use as a vascular graft.

42. An article comprising a porous polymeric tube having a circumference wherein the circumference of said porous polymeric tube increases in response to the application of a circumferentially distending force, wherein the porous polymeric tube exhibits recoil of 14 percent or less following removal of the circumferentially distending force.

43. A tube according to claim 42 wherein the recoil is 10 percent or less.

44. A tube according to claim 43 wherein the recoil is 7 percent or less.

45. A tube according to claim 42 wherein the tube ~~comprises~~ adapted for use as a vascular graft.

46. A tube according to claim 45 wherein the vascular graft is comprised of porous polytetrafluoroethylene.

47. A tube according to claim 46 wherein the application of the circumferentially distending force is the result of inflation of a balloon catheter.

48. A tube according to claim 46 wherein the application of the circumferentially distending force is from the application of blood pressure.

49. A tube according to claim 46 wherein the vascular graft has a wall thickness less than about 0.25 mm.

50. A tube according to claim 46 wherein the vascular graft is secured by the use of sutures.

51. A tube according to claim 46 wherein the vascular graft is secured by a stent.

52. A tube according to claim 46 wherein the circumference of said vascular graft increases in response to the application of internal pressure up to a second circumference, thereafter the circumference remaining substantially unchanged with increasing internal pressure.

53. A tube according to claim 52 wherein the application of internal pressure is the result of inflation of a balloon catheter.

54. A tube according to claim 52 wherein the application of internal pressure is from the application of blood pressure.

55. A tube according to claim 52 wherein the vascular graft has a wall thickness less than about 0.25 mm.

56. A tube according to claim 52 wherein the vascular graft is secured by the use of at least one suture.

57. A tube according to claim 52 wherein the vascular graft is secured by a stent.

58. A tube according to claim 45 wherein the vascular graft adapted for use as ~~comprises~~ an intraluminal graft.

59. A tube according to claim 58 wherein the application of internal pressure is the result of inflation of a balloon catheter.

60. A tube according to claim 58 wherein the application of internal pressure is from the application of blood pressure.

61. A tube according to claim 58 wherein the intraluminal graft has a wall thickness less than about 0.25 mm.

62. A tube according to claim 58 wherein the intraluminal graft is secured by the use of at least one suture.

63. A tube according to claim 58 wherein the intraluminal graft is secured by a stent.

64. A tube according to claim 58 wherein the circumference of said intraluminal graft increases in response to the application of internal pressure up to a second circumference, thereafter the circumference remaining substantially unchanged with increasing internal pressure.

65. A tube according to claim 64 wherein the application of internal pressure is the result of inflation of a balloon catheter.

66. A tube according to claim 64 wherein the application of internal pressure is from the application of blood pressure.

67. A tube according to claim 64 wherein the vascular graft has a wall thickness less than about 0.25 mm.

68. A tube according to claim 64 wherein the vascular graft is secured by the use of at least one suture.

69. A tube according to claim 64 wherein the vascular graft is secured by a stent.

~~70. A tube according to claim 43 wherein the tube is comprised of porous polytetrafluoroethylene.~~

~~71. A tube according to claim 70 wherein the tube has a wall thickness less than about 0.25 mm.~~

72. A tube according to claim 70 wherein the circumference of the tube increases in response to the application of internal pressure up to a second ~~circumference~~, thereafter the circumference remaining substantially ~~unchanged~~ with increasing internal pressure.

73. A tube according to claim 72 wherein the tube has a wall thickness less than about 0.25 mm.

74. A tube according to claim 43 wherein the tube ~~comprises~~ adapted for use as an intraluminal graft.

75. A tube according to claim 74 wherein the intraluminal graft has a wall thickness less than about 0.25 mm.

76. A tube according to claim 74 wherein the circumference of said intraluminal graft increases in response to the application of internal pressure up to a second circumference, thereafter the circumference remaining substantially unchanged with increasing internal pressure.

77. A tube according to claim 76 wherein the vascular graft has a wall thickness less than about 0.25 mm.

~~78. A tube according to claim 44 wherein the vascular graft is comprised of porous polytetrafluoroethylene.~~

79. A tube according to claim 78 wherein the vascular graft has a wall thickness less than about 0.25 mm.

80. A tube according to ~~claim~~ 78 wherein the circumference of said vascular graft increases in ~~response~~ to the application of internal pressure up to a second ~~circumference~~, thereafter the circumference remaining substantially unchanged with ~~increasing~~ internal pressure.

81. A tube according to claim 80 wherein the vascular graft has a wall thickness less than about 0.25 mm.

82. A tube according to claim 44 wherein the tube ~~comprises~~ adapted for use as an intraluminal graft.

83. A tube according to claim 82 wherein the intraluminal graft has a wall thickness less than about 0.25 mm.

84. A tube according to claim 82 wherein the circumference of said intraluminal graft increases in response to the application of internal pressure up to a second circumference, thereafter the circumference remaining substantially unchanged with increasing internal pressure.

85. A tube according to claim 82 wherein the vascular graft has a wall thickness less than about 0.25 mm.

86. An article comprising a tube having a circumference wherein the circumference of said tube increases in response to the initial application of blood pressure.

87. A tube according to claim 86 wherein said tube ~~comprises~~ adapted for use as a vascular graft.

88. A tube according to claim 87 wherein the vascular graft ~~comprises~~ adapted for use as an intraluminal graft.

~~89. A tube according to claim 88 wherein the vascular graft is comprised of porous polytetrafluoroethylene.~~

90. A tube according to claim ~~88~~ 86 wherein the tube is comprised of porous polytetrafluoroethylene.

91. A tube according to claim 86 wherein the tube exhibits minimal recoil following removal of blood pressure.

92. A tube according to claim 91 wherein the minimal recoil is 14 percent or less.

93. A tube according to claim 92 wherein the minimal recoil is 10 percent or less.

94. A tube according to claim 93 wherein the minimal recoil is 7 percent or less.

95. A tube according to claim 91 wherein the tube ~~comprises~~ adapted for use as a vascular graft.

96. A tube according to claim 95 wherein the vascular graft ~~comprises~~ adapted for use as an intraluminal graft.

97. A tube according to claim 91 wherein the tube comprises porous polytetrafluoroethylene.

98. A method of making a tube having a longitudinal axis and having a second circumference said method comprising:

a) obtaining a first tube of porous polytetrafluoroethylene having an inside diameter and an exterior surface, and fitting said first tube over a first mandrel having an outside diameter corresponding to the inside diameter of the first tube;

b) fitting a second tube of porous polytetrafluoroethylene coaxially over said first tube, said second tube having an inside diameter larger than the outside diameter of the first tube and said second tube comprising helically wrapped porous polytetrafluoroethylene film;

c) applying tension to the second tube parallel to the longitudinal axis of the tube whereby the inside diameter of the second tube is reduced causing the inside diameter of the second tube to conform to the exterior surface of the first tube;

d) longitudinally restraining the first and second tubes to the first mandrel to prevent longitudinal shrinkage, heating the first and second tubes adequately to cause the first and second tubes to become bonded together;

e) removing the bonded first and second tubes from the first mandrel and fitting them over a second mandrel having an outside diameter larger than the outside diameter of the first mandrel, wherein the outside diameter of the second mandrel substantially corresponds to the second circumference;

f) removing the bonded first and second tubes from the second mandrel; and

g) applying tension to the bonded first and second tubes causing a reduction in circumference to a circumference smaller than the second circumference.

99. A method according to claim 98 wherein the bonded first and second tubes are heat treated prior to their removal from the second mandrel.

100. A method according to claim 99 wherein the bonded first and second tubes, following their removal from the second mandrel, are coaxially fitted over the first mandrel and tensioned longitudinally to cause them to conform to the outside diameter of the first mandrel, and subsequently heat treated and removed from the first mandrel.

101. A method according to claim 100 wherein said tube comprises a vascular graft.

102. A method according to claim 101 wherein the vascular graft comprise an intraluminal graft.

103. A method according to claim 98 wherein said tube comprises a vascular graft.

104. A method according to claim 103 wherein the vascular graft comprises an intraluminal graft.

105. A method of repairing an arteriovenous vascular graft having a lumen, comprising inserting an intraluminal graft into the lumen of the arteriovenous vascular graft and causing the intraluminal graft to conform to the lumen of the arteriovenous vascular graft.

106. A method according to claim 105 wherein the intraluminal graft is comprised of porous polytetrafluoroethylene.

107. A method according to claim 106 wherein the intraluminal graft is caused to conform to the lumen of the arteriovenous vascular graft by blood pressure.

108. A method according to claim 106 wherein the intraluminal graft is caused to conform to the lumen of the arteriovenous vascular graft by inflating a balloon catheter.

109. A method according to claim 106 wherein the intraluminal graft is secured to the arteriovenous vascular graft by at least one suture.

110. A method according to claim 106 wherein the intraluminal graft is secured to the arteriovenous graft by the use of a stent.

111. A method according to claim 106 wherein the intraluminal graft extends beyond the arteriovenous vascular graft into a vein.

112. A method according to claim 105 wherein the intraluminal graft is caused to conform to the lumen of the arteriovenous vascular graft by blood pressure.

113. A method according to claim 105 wherein the intraluminal graft is caused to conform to the lumen of the arteriovenous vascular graft by inflating a balloon catheter.

114. A method according to claim 105 wherein the intraluminal graft is secured to the arteriovenous vascular graft by at least one suture.

115. A method according to claim 105 wherein the intraluminal graft is secured to the arteriovenous graft by the use of a stent.

116. A method according to claim 105 wherein the intraluminal graft extends beyond the arteriovenous vascular graft into a vein.

117. A method of lining a blood conduit with an article having a longitudinal axis, said method comprising:

a) providing a first porous PTFE material made into the form of a first tube having an inside diameter and an exterior surface, the first material comprising PTFE having fibrils oriented in a first direction;

b) providing a second porous PTFE material made into the form of a second tube fitted coaxially over the first tube, the second material having an inside diameter larger than the outside diameter of the first tube, said second tube including PTFE having oriented in a second direction;

c) bonding the first and second materials together to form the article, the article being capable of distending upon introduction of an internal pressure in the article;

d) placing the covering in a blood conduit; and

e) applying pressure to the article to distend it to an enlarged diameter, lining the blood conduit.